

# MINNEAPOLIS HONEYWELL REGULATOR COMPANY



MODUSTAT Automatic Modulating Orifice  
System of Individual Room Temperature Control

MODUTROL System of Air Conditioning Control

ZONE and UNIT HEATER Control Systems

AUTOMATIC CONTROLS for Oil and  
Gas Burners, Stokers, Dampers, Refrigeration  
« « « and Industrial Processes » » »

Branch Offices or Distributors in All Principal Cities  
Main Office . . . . . MINNEAPOLIS, MINN.



## THE MODUSTAT

### A Self-contained Automatic Room Temperature Control Valve for Individual Radiators

Outdoor temperature is by no means the only factor that must be taken into consideration, if all rooms within a building are to be equally heated at all times.

It is obvious that rooms on the shady side of buildings, receiving no warmth from the sun, require more steam to heat them than those benefiting from the direct rays of the sun.

When the rooms in shadow happen also to be directly exposed to the chilling effects of wind, the disparity in steam requirements for different sides of the building is even more aggravated.

Because these factors (wind direction, wind velocity, solar radiation, number of people in a room, etc.) are so shifting, it is impossible in advance to calculate how much steam should be delivered to a room to keep it uniformly warm at all times. The amount of

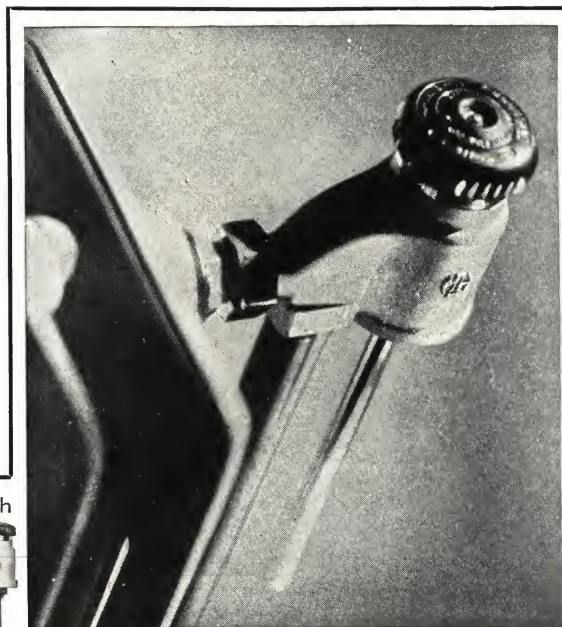
steam admitted to the radiator must be continually altered to keep the room temperature steady by reducing or enlarging the size of the radiator orifice in accordance only with the need of the particular room in which the radiator is located, and without regard to the temperature requirements of other rooms or parts of the building.

That is exactly what the Minneapolis-Honeywell *Modustat* does automatically.

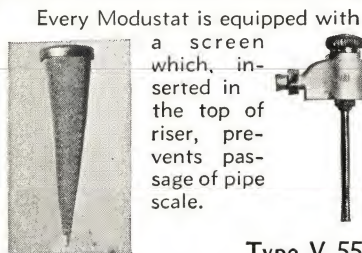
In response to the temperature of the room in which the radiator it is controlling is located, it admits just enough steam through its orifice to offset heat losses from the room and keep that room temperature constant.

The *Modustat* is finely finished, compact and inconspicuous.

It is as easily installed as an ordinary hand valve on all types of 2-pipe steam, vapor or vapor-vacuum systems.



**Type V55-1 Modustat**  
For direct (exposed) radiation



Every *Modustat* is equipped with a screen which, inserted in the top of riser, prevents passage of pipe scale.

#### **Type V-55 Modustat**

##### *For Direct (Exposed Cast Iron) Radiation*

The sensitive thermostatic medium of this model is located in the bottom of an extension of the valve casting itself. It is built to withstand all manner of abuse. The thermal extension is so sturdy that a tension of 250 lbs. at the extreme end is required to bend it and even then its operating efficiency is not destroyed. A baffle, in which a fine hole is drilled, divides the tube into two chambers. The volatile liquid is retained in that portion of the tube which is below the baffle, only the vapor produced by gasifying the liquid being able to pass through the drilled hole.

The baffle virtually isolates the lower chamber in the tube from the upper, and by so eliminating circulation prevents heat transfer by convection from the upper chamber located in the steam space, to the lower chamber located in the air temperature of the room.

#### **Type V-56 Modustat**

##### *For Concealed (Cabinet or Indirect) Radiation*

The thermal extension of the valve body is eliminated in this model and a flexible hollow wire with a volatile containing bulb which is protected, when installed, by the radiator cabinet or housing, is substituted. This bulb may be placed in any position that will most nearly represent the temperature of the air returning to the heater.

The bulb may, in indirect systems, be placed above the valve if the hollow wire between the valve body and control valve is so placed as to be exposed to a higher temperature than the bulb itself.

Mechanism is available by means of which the Type V-56 *Modustat* may be conveniently adjusted from the exterior of the grille or cabinet.



**Type V56-2 Modustat**  
For indirect or cabinet radiation. Key-set adjustment



### Economy

In addition to the perfect comfort of the room occupants due to the amazing uniformity of temperature achieved by this automatically modulating orifice system of individual radiator control, extraordinary economy of steam consumption is a natural consequence. Because sufficient radiation must be installed in a building to heat it during the coldest of days (which Government records show approximately only 4% of the entire heating season), it is inevitable that, unless orifices are modulated, the radiators will be delivering more heat than is wanted 96% of the time!

### Automatically Lowered Night Temperature

In those buildings whose heating plants are subject to automatic or manual adjustment of boiler pressures or boiler differentials, the Modustat offers the opportunity of reducing the temperature in the building at night through the lowering of boiler pressures or the reduction of differentials. Should, however, the occupant of any office wish to work at night, that one office or any number of offices may, by a single movement of the adjusting mechanism, continue the daytime temperature.

## MODUSTAT FEATURES OF DESIGN AND CONSTRUCTION

### The Design

Sturdiness, simplicity, protection of all actuating parts, and accuracy, are salient features of the Modustat design. It is built entirely of indestructible metals. All working mechanism being within the sturdy brass housing, it is protected against the possibility of tampering.

Immunity from the effects of conducted heat is achieved without the use of any insulating materials.

The Modustat consists of three units:

(1) **The Thermostatic Element**—This unit is made in two designs. The Type V-55 is for exposed radiation. The Type V-56 is for concealed radiation.

The thermal element in either type may be replaced without removing the valve body from the line.

(2) **The Valve Body**—This is a sturdy, permanent brass casting.

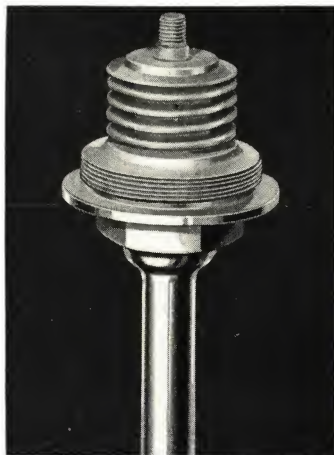
(3) **The Adjusting Unit**—This is completely enclosed, with the exception of the hand wheel used in the -1 type. This hand wheel is of bakelite, the only breakable part of the entire valve.

The -2 type, key set, is all metal provided with metal adjusting key.

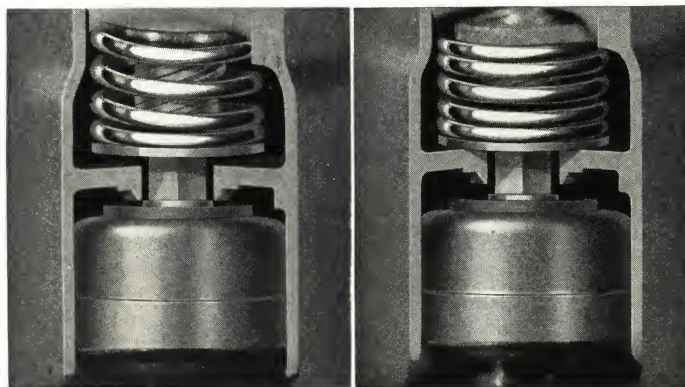
### The Adjusting Unit

It is extremely simple to adjust the Modustat so that it will maintain the room temperature desired by the occupant of each room, without regard to the temperatures maintained in other rooms or parts of the building. The hand wheel indicates the normal setting which suits most people but the Modustat can be set at any point desired between 80° and 40°.

The 40° minimum temperature setting prevents the possibility of freezing of the radiator or plumbing fixtures.



The thermostatic element is replaceable without removing the valve from the line



The automatically controlled orifice of the Modustat is seldom either completely open or completely closed. This is a true modulating valve, always supplying just enough steam to the radiator to offset heat losses and keep the room temperature precisely uniform

### Construction

A nickel alloy bellows forms the flexible or motion transmitting medium through which the expansion or contraction of the volatile liquid is transmitted to the valve disc, causing the disc to move to the seat, reducing the size of the orifice as room temperature increases; and enlarging the orifice as room temperature decreases. Nickel alloy is impervious to the corrosive influence of chemically softened or naturally impure water.

The valve disc is readily replaceable, if necessary, without removing the valve body from the line; though no disc, after three years' service, has ever required replacing.

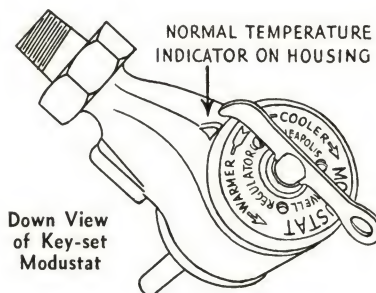
The spring designed to counteract the volatile expansion super-induced by room temperature rise is of selected stainless steel. It is oversized and is worked far below its distortion limit.

The so-called "packed packless" type of seal is used because of its reliability and popularity among those experienced in valve strength and weakness.

The packing cone is under constant spring tension insuring a tight valve under either vacuum or pressure.

### With Zone Control

In many buildings the steam flow main and riser loss form a not inconsiderable part of the total heat losses. Under such conditions, Minneapolis-Honeywell zone or sectional control will carry Modustat individual radiator control a step farther. See pages 7 and 8 for zone control.





# INSTALLATION AND SPECIFICATION FOR MODUSTAT TEMPERATURE CONTROL VALVES

## INSTALLING THE MODUSTAT

Diagrams show how the Modustat is installed to control individual room temperature by automatic modulation of the heat supply to every common type of radiator and convection heater. The Modustat system is designed for use *only with two-pipe* (direct or indirect) steam, vapor or vapor-vacuum heating, operated on pressure not to exceed 10 lbs. and vacuums not to exceed 10 in. The Modustat,  $\frac{1}{2}$ -in. and  $\frac{3}{4}$ -in. sizes, control up to 100 sq. ft. of cast iron radiation or its equivalent. The 1-in. and  $1\frac{1}{4}$ -in. sizes control correspondingly greater amounts.

### How Installed

Installation of the Modustat in any large building, old or new, is as simple as that of any ordinary hand-operated valve. In most cases, the ordinary hand-valve need merely be removed and the Modustat installed, without any changes in piping or extra fittings. The Modustat is placed on the riser and attached to the radiator inlet. The only remaining operation is then to establish the normal orifice necessary to produce the proper temperature for the individual room.

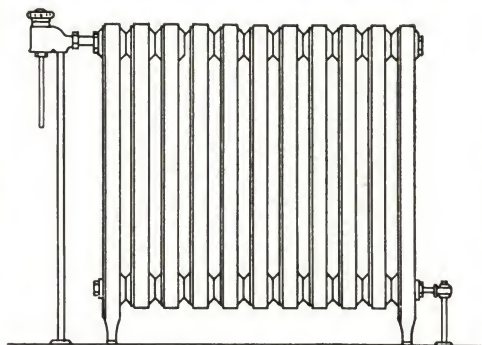
The requirements of the occupant, according to his needs or individual preferences, determine the degree of temperature desired.

Adjustment of the Modustat is made by a simple manipulation of the hand-wheel or key. The normal setting for comfort is indicated on the instrument, and easily varied to meet individual preferences. Thereafter, the Modustat operates automatically to keep the room temperature precisely uniform, enlarging or decreasing the orifice to compensate immediately for variations in heat loss.

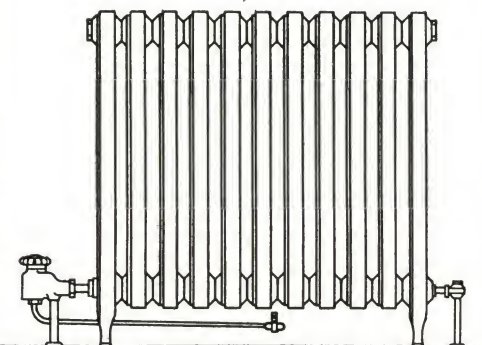
### For Every Type of Radiator or Convection Heater

Because it is made in both the "self-contained" and "remote" types, every

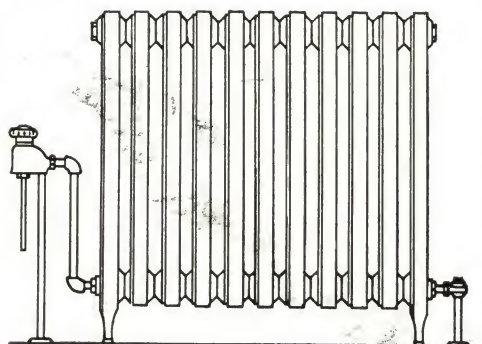
existing form of radiation on a *two-pipe system* can be Modustat controlled. Roughing-in requirements are no different than those of an ordinary hand control valve.



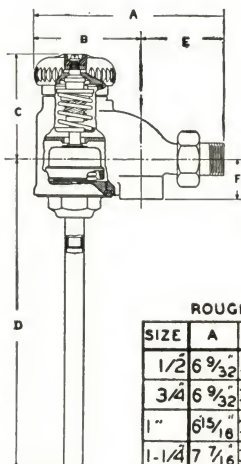
Installation of V-55 on Top Feed Radiator



Installation of V-56 on Bottom Feed Radiator



Installation of V-55 on Bottom Feed Radiator



Drawing of V-55 Modustat and Roughing-in Dimensions

(Body dimensions of Type 56 are identical with those of Type 55)

ROUGHING IN DIMENSIONS

SIZE	A	B	C	D	E	F
$1\frac{1}{2}$	$6\frac{9}{32}$	$3\frac{17}{32}$	$3\frac{1}{4}$	$9\frac{3}{4}$	$2\frac{3}{4}$	$13\frac{3}{32}$
$3\frac{3}{4}$	$6\frac{9}{32}$	$3\frac{17}{32}$	$3\frac{1}{4}$	$9\frac{3}{4}$	$2\frac{3}{4}$	$13\frac{3}{32}$
1"	$6\frac{5}{16}$	$3\frac{5}{16}$	$3\frac{3}{8}$	$10\frac{1}{2}$	$3"$	$1\frac{7}{8}$
$1\frac{1}{4}$	$7\frac{1}{16}$	$3\frac{5}{16}$	$3\frac{3}{8}$	$10\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{3}{4}$

## SPECIFICATION FOR MODUSTAT TEMPERATURE CONTROL VALVES

1. This contractor shall furnish and install on each unit of direct radiation throughout the building an individual, self-contained radiator control valve, of size as indicated on the tapping schedule. The valves shall be sturdy, compact, tamper-proof and so constructed that both actuating mechanism and thermostatic element shall be completely enclosed. The valves shall be of the vapor tension type. They shall maintain within two (2) degrees the desired room temperature, adjustable for a range of 40° F. to 80° F. The valves shall be guaranteed to be free from defects in either workmanship, material or performance for a period of one year from the date of completion of the installation.

2. (For exposed cast iron radiators)—

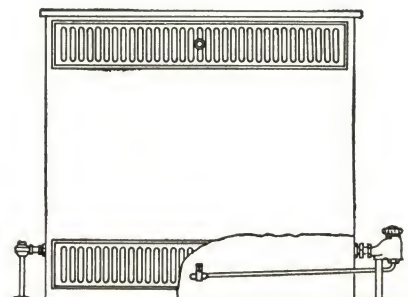
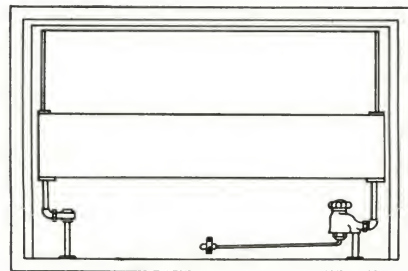
The valves shall be MINNEAPOLIS-HONEYWELL REGULATOR COMPANY'S type V-55 Modustats equipped with:

- a. Bakelite hand wheels with or without high limit stops.
- b. Lock shield adjustment with sufficient number of adjusting keys.

3. (For concealed or recessed radiators)—

The valves shall be MINNEAPOLIS-HONEYWELL REGULATOR COMPANY'S type V-56 Modustats equipped with:

- a. bakelite hand wheels with or without high limit stops.
- b. Lock shield adjustment with sufficient number of adjusting keys.
- c. Extension handwheel adjustment operated from exterior of cabinet or grille, as shown.
- d. Extension lock shield adjustment unit operated from exterior of cabinet or grille, as shown.





## THE MODUTROL SYSTEM

### of Automatic Ventilating and Air-conditioning Control for Unit Ventilators—Central Distributing Systems

Electrical modulation of mixing and fresh air dampers in Unit Ventilators or Plenum Chamber Systems, or of heating or tempering coils, is the Minneapolis-Honeywell response to the need for more flexible, more sensitive, dependable air conditioning control. Heating-ventilating equipment has been greatly improved during the past few years, but its completely satisfactory operation, in the final analysis, depends upon the use of properly engineered automatic electric control.

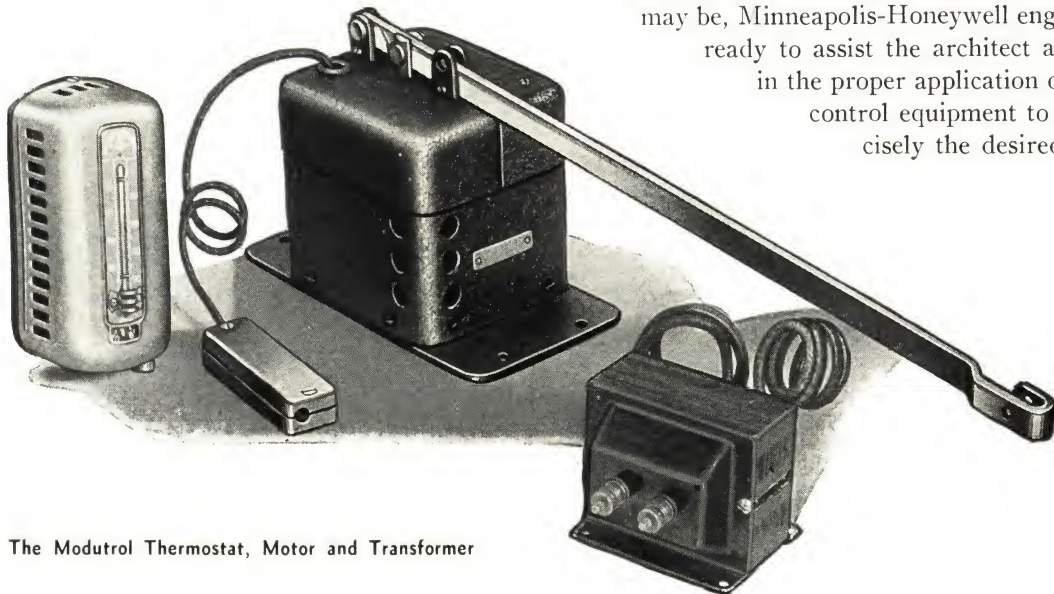
The Minneapolis-Honeywell Modutrol System is a complete line of electrically operated modulating controls for air conditioning and heating-ventilating equipment. It meets the problem which has grown from the increased use of air conditioning equipment in schools, theatres, stores, auditoriums, banks and other large spaces. Correct, dependable, automatic control of heating-ventilating systems now widely used in schools, long

considered a difficult problem, now consists only of the proper application of the precise, flexible Modutrol System.

The correct design of a system of temperature control is primarily based on two factors: exposure and occupancy. Differences in outdoor temperature, wind direction, wind velocity, exposure, and solar radiation impose an individual set of conditions on every building installation. Seldom are two applications identical.

From the complete Modutrol System the heating engineer chooses the right controls to meet the specific requirements of each installation. Modutrol Thermostats, Aquastats, and Pressurestats are available to cover a wide field of application in space heating, air conditioning and industrial process control, where true modulation, accuracy, dependability and minimum upkeep are desirable.

Whatever the exact control requirements of the job may be, Minneapolis-Honeywell engineers stand ready to assist the architect and engineer in the proper application of automatic control equipment to deliver precisely the desired results.



The Modutrol Thermostat, Motor and Transformer

## MODUTROL MANUFACTURERS SPECIFICATIONS

### Modutrol Thermostat

Type No.: T 91-1.

Scale Range: 60°-80° F.

Finish: Height: Width: Depth:

Dimensions: 2¼-in. wide, 2½-in. deep, 5¼-in. high.

Capacity: 5 watts @ 20 volts.

**Type T 91-1**—Bellows actuated variable resistance Potentiometer type.

Completely modulating, operation of sensitive bellows varies resistance of Potentiometer unit which determines position of Modutrol Motor.

### Transformer

Primary: 110 volts, 60 cycle A.C. Std. See Motor specifications for specials.

Secondary: Control circuit 5 W. @ 20 V. Motor circuit 15 W. @ 20 V.

### Modutrol Motor

Type No.: M 91-1.

Operation: Modulating.

Note: To be used with Type No. T 91-1 Thermostat only.

Dimensions: See Chart page 9.

Torque: 10 lbs. at end of 15½-in. lever arm.

Stroke: 2½ in. at end of arm.

Current characteristics: 20 volts, 60 cycle A.C. model is standard.

Furnished for other voltages and frequencies at slight extra cost. Not available for D.C.

Type No.: M 80-1.

Specifications same as for Type M 91-1 except Motor is non-modulating two position type for use with Series 40 mercury switch control instruments or on manual operation.

Series 10 mercury tube type limit controls may be used with either Type M 91-1 or Type 80-1 Motors.



## THE MODUTROL MOTOR

### Function

The Modutrol Motor operates as a Modulating Control of dampers, louvers, valves, etc.

### Operation

The Type M 91-1 Modutrol Motor (modulating type) is for use only with the Type T 91-1 Modutrol Thermostat.

The operation of the Modutrol Thermostat and Motor is as follows:

The thermostat contact blade is moved across the potentiometer in the thermostat as the room temperature varies minutely. As this blade moves, it varies the current flow through the resistance windings of two warp switches in the motor, causing them to move in relation to heat variation in these windings. This varies the position of the motor contact blade in relation to the inclined contact plate.

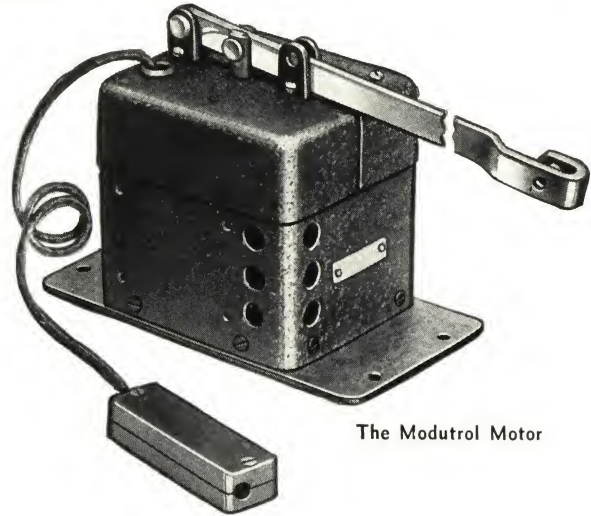
Contact between warp switch contact and inclined contact plate on the drivepost completes the circuit through the heating unit. The resultant gas pressure in the motor operating unit raises the drivepost. The drivepost continues to rise until contact is broken on the inclined contact plate. The motor arm then remains in the position to which the drivepost has moved it until variation in the Potentiometer Thermostat resistances, as above described, causes it to assume another position. The motor develops the same power regardless of temperature increase demanded. Current flow through the motor heating unit is interrupted when the motor arm has assumed the position called for by the thermostat. Continued absence of pressure in the bellows allows the arm to progress toward the "off" position until contact on the inclined contact plate is re-established by continued or renewed demand by the thermostat.

### Advantages

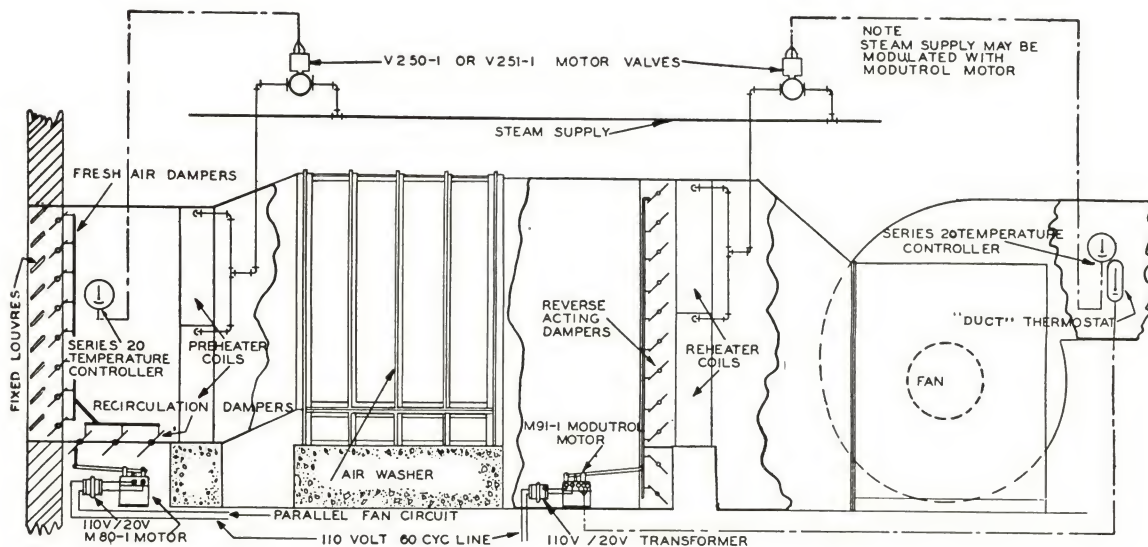
- (1) Extreme accuracy of control.
- (2) Absolute silence of operation.
- (3) Simplicity of construction.
- (4) No lubrication necessary.
- (5) Automatic assumption of predetermined position on power

failure with automatic return to thermostatic control on resumption of current. Motor may be arranged to assume either open or closed position on power failure.

- (6) True Modulation—no over-run.
- (7) Large amount of power available.
- (8) Automatic cleaning of all contacts.
- (9) Low voltage control circuit.
- (10) One controller may operate several motors through dual control switches.
- (11) Mounting plate enabling motor to be placed in any position, except upside down.
- (12) Manual operation of dampers or valves does not damage or interfere with motor operation.
- (13) Independence of individual units.
- (14) Standard high or low limit controls may be used in circuits.



The Modutrol Motor



### Automatic Control of Central Fan System

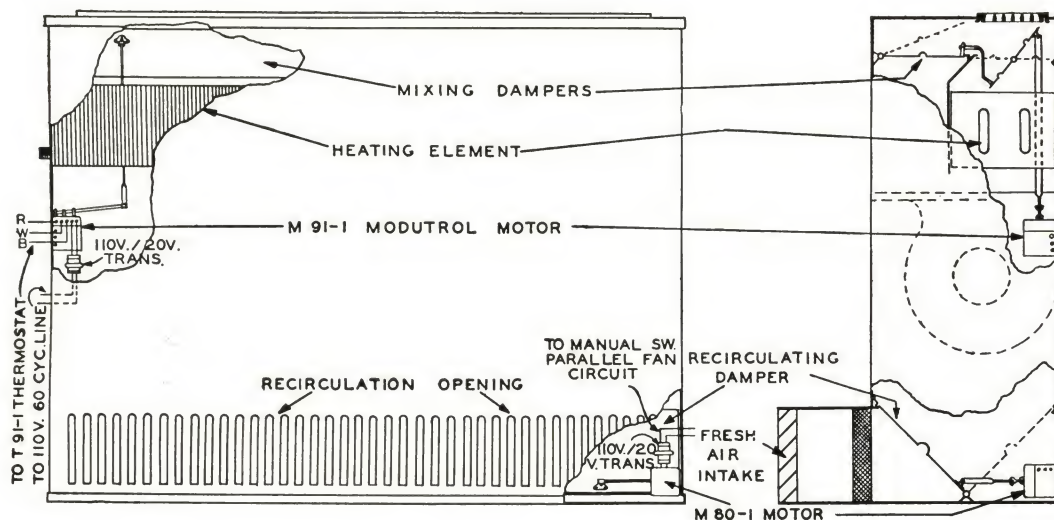
Fresh air and recirculation dampers are controlled by an M 80-1 Non-modulating Motor which opens the fresh air and closes the recirculating dampers on starting of the fan. An M 91-1 Modulating Motor may be substituted in this location if proportioning of the fresh air and recirculating dampers is desired. Preheater coils are controlled by an M 91-1 Modulating or V 250-1 or V 251-1 Non-modulating Motor Valves operated by a controller in the fresh air chamber.

The delivered air temperature is maintained at the predetermined point by a Duct Thermostat in the duct beyond the fan. This instrument controls the air flow through the reheating

coils by modulation of the reverse acting dampers connected to an M 91-1 Modulating Motor, thus constantly proportioning the volume of heated and bypassed air according to demand of the Duct Thermostat in the discharge duct. Steam delivery to the reheater coils is regulated by either a modulating or non-modulating motor valve under command of a controller in the delivered air duct.

This illustrates and describes only one of many systems of air conditioning.

The extreme flexibility of the Modutrol System allows its adaptation to any control requirement.



### Unit Ventilator Application

The control of unit ventilators is easily and perfectly accomplished by the Modutrol.

The Modutrol Thermostat, installed in the correct location on the wall, operates a Type M 91-1 Motor to which are connected the warm and fresh air dampers.

A second motor, Type M 80-1 Non-modulating, is connected

in parallel with the fan motor to operate the recirculating damper, opening it as the fan starts and closing it when the fan is turned off. A manual switch may be used in series with the M 80-1 Motor to allow the recirculating damper to be kept closed for quick heating. Convenient mounting brackets and proper linkages for connection are available.

### Schematic Drawing Unit Ventilator Control

One common method of controlling unit ventilators such as shown in diagram No. 3 is illustrated. With the closing of the line switch, all of the fan motors are started. At the same time the Modutrol Motors open the recirculating dampers. The Modutrol Motors operating the mixing dampers are separately connected to the fan circuit and each operates on command of its own thermostat. If quick heating is desired, a switch may be placed in the line to the recirculating damper motors, enabling them to be manually closed whenever necessary.

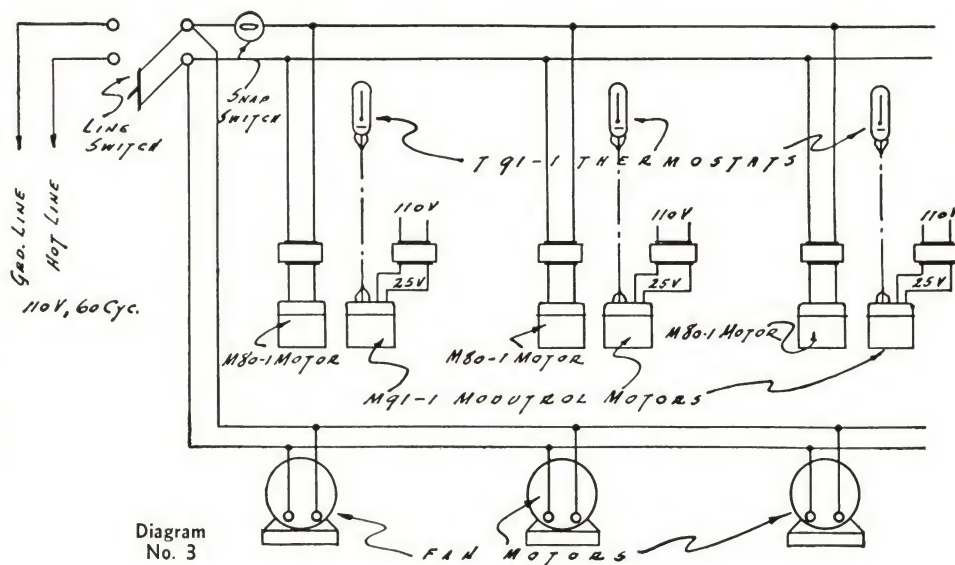
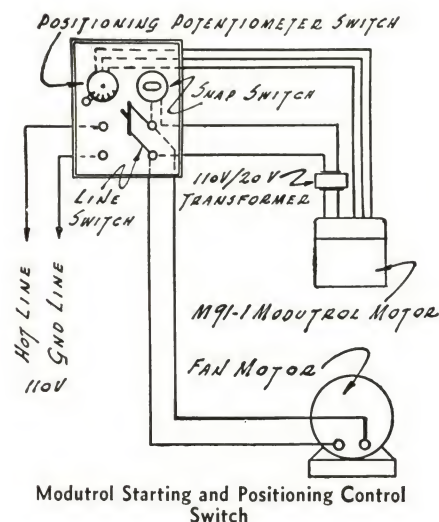


Diagram No. 3



### Modutrol Starting and Positioning Control Switch

Schematic wiring of manual starting and positioning switches (shown at left) is optional, simply providing a means of either running the fan without any control of dampers or louvres, or of manually setting them at a fixed position. The hookup is used with either unit ventilators or central fan hookups.

### Vent Stack Control

On many installations it is desirable to have a damper in the vent stack automatically close when the exhaust fan shuts down. This may be accomplished by placing a Type M 80-1 Non-modulating Motor in parallel with the fan or blower. The roof ventilator damper will then open and close simultaneously with the operation of the exhaust fan.

### Modustat on Radiator

Cast or concealed radiation may be individually controlled by the Modustat automatic orifice system. Type 55 for exposed top inlet radiators; Type 56 for concealed and bottom inlet radiation. Furnished with hand or key set adjustment as desired. (See pages 1, 2 and 3).



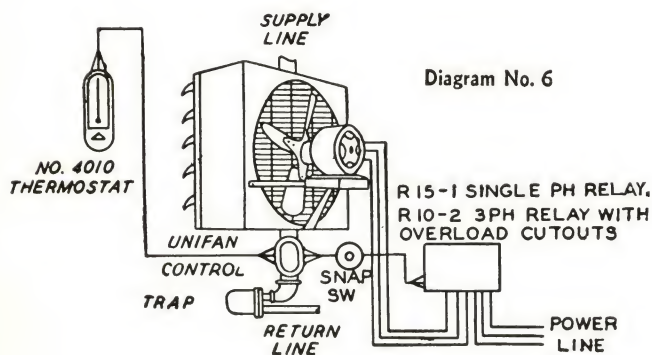
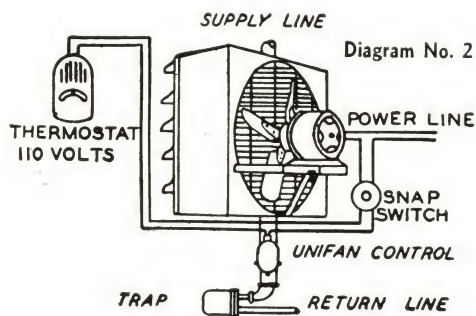
# UNIT HEATER AND ZONE OR SECTIONAL CONTROL SYSTEMS

## Unit Heater Control Systems

The nature of the unit heater method of delivering heat makes automatic controls an absolute essential if any degree of satisfaction and economy of operation is to be obtained.

Minneapolis-Honeywell controls meet the requirements of all types of installations. The simpler of these is satisfied by the mercury tube type of thermostat, while complete and precise systems can only be obtained through the use of low voltage thermostats, limiting devices, motor valves, and relays. These complete systems of control so govern the unit heater as to make it not only completely automatic, but highly satisfactory and decidedly economical in operation.

Unit heaters can be controlled either individually or in batteries, and can be grouped with direct radiation under complete control systems, which render fully automatic, not only the direct radiation and unit heaters themselves, but extend their command to the heat producing medium, be it oil, gas or coal. The diagrams illustrate a few of the installations to which Minneapolis-Honeywell controls are adaptable. Each heating system presents problems entirely its own, and there are many control layouts possible which have not been shown. Minneapolis-Honeywell engineers will work with you (at no charge) toward the solution of your problem.



## Battery Unit Heater Control

On some installations it is feasible to group the units in batteries operating under control of a single thermostat. Although this method of control is not often

## Zone or Sectional Control Systems

Exposure and occupancy are two principal factors determining the correct zone control system. Changes in wind velocity, wind direction, solar radiation, number of people in a section of a building, etc., all effect changes in the heat input requirements of the section at different times.

Zone or sectional control may be subject to the command of a plain thermostat which operates at a temperature that is variable by hand setting, or it may be subject to the command of a clock thermostat which will operate at a predetermined temperature for a specified period, at the termination of which the temperature is either raised or lowered automatically to some other predetermined point.

The importance of the exclusive Minneapolis-Honeywell Sectional Control features offered in the combination of Clock Control with Steam Flow Control can hardly be overestimated, when due consideration is given to the fact that under usual working conditions the stand-by period, when all motorized control valves are closed has been shown by test to approximate 69% of the time during the mild weather and not under 42% in severe weather—an average of about 50% of all heating time for the season.

## Line Voltage Thermostat with "Unifan Control"

The "Unifan Control" is provided in this system to prevent the operation of the fan whenever the coils chill through failure of the steam supply. Either Type L46-1 (Pressure) or Type L44-1 (Temperature) Unifan Control may be used.

## Type 4010 Thermostat, "Unifan Control" and Relay

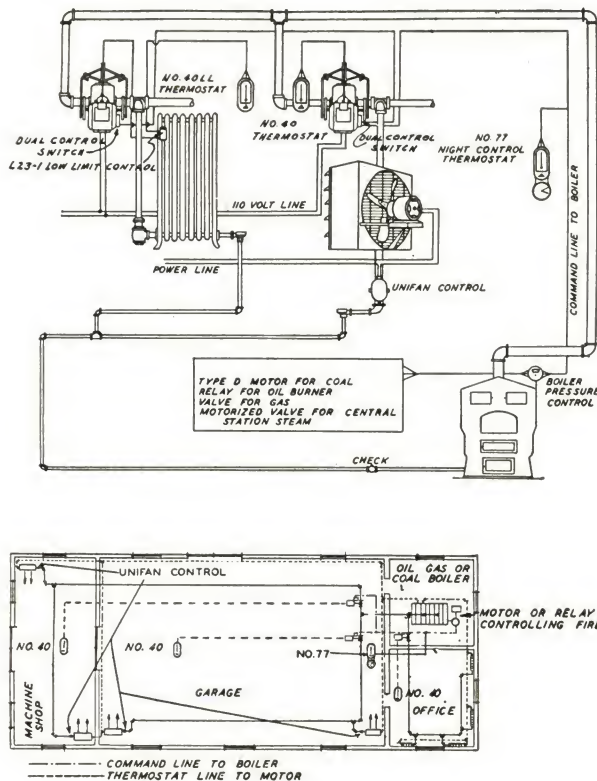
The "Unifan Control" is provided in this system to prevent the operation of the fan whenever the coils are cold due to lack of steam. Type L16-1 (Pressure), or Type L14-1 (Temperature) may be used.

Type R15-1 Relay for 110 volts to 220 volts single phase current; Type R10-2 with overload cutouts for 3 phase current; Type R41-1 for 3 phase current without overload protection.

practicable it is used in cases where the units are small, and the space they are to heat may be adequately controlled from one thermostat.



## Group Clock Control



In buildings where sectional control of Unit Heaters, Direct Radiation or a combination of the two is desirable and where it is practical to lower at one time the temperature requirements of all sections to the Night Temperature, "Group Clock Control" is recommended.

In Group Clock Control each section is under command of its Thermostat and Steam Flow Control Valve with Unifan Control.

One Type 77 Thermostat is placed in command of all so that at any predetermined hour the temperature requirements are reduced to 55° or 60° and the automatic Gas or Oil Burner, Stoker or Central Steam Plant Line is definitely closed down and held off until a predetermined hour in the morning, unless the temperature falls below the point for which the 77 Thermostat indicator is set. The Type 77 Thermostat with Week End Shutoff permits a low temperature to be maintained over Sunday or both Saturday and Sunday with automatic return to day time temperature Monday morning. The Type 77 Thermostat in Group Clock Control is the medium of night temperature control essential, for example, in protecting thermostatically sprinkler systems, etc., against freezing.

The low limit control, maintaining a minimum radiator temperature, acts to prevent air stratification in the portion of the building heated by cast iron radiation, and by operating the heat supply more frequently effects a much faster pickup when any thermostat calls for heat. This also reduces the peak loads on the boiler, and also lessens still farther the fluctuations in building temperature.

The steam flow control valves should be placed as close to the source of heat—boiler or incoming line—as possible, in order to reduce line condensation loss to a minimum.

The 40LL Thermostat is so designed that in mild weather, the low limit control is inoperative.

**Note:** See next page for detailed information on Minneapolis-Honeywell Thermostats.

## MOTORIZED VALVES FOR AUTOMATIC REMOTE TEMPERATURE CONTROL IN LARGE BUILDINGS

For Hot Water Heating Systems and Low and High Pressure Steam Heating Systems

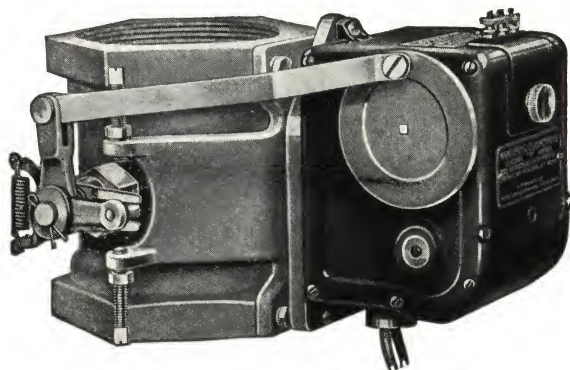
### Type VB20-1 Motorized Butterfly Valve

For Hot Water Heating Systems

Through the use of these valves in conjunction with room thermostats, automatic remote temperature control in large buildings employing hot water systems is possible. Specific temperature requirements in definite sections or on certain floors are accurately regulated. In operation these valves open to permit the flow of hot water to the radiators of only those sections where the

room thermostats are calling for heat; otherwise they are closed.

On gravity type hot water installations using the Summer-Winter Control the use of a Type VB20-1 is essential. In this application the valve prevents circulation of the boiler water to the radiator when the room thermostat is not demanding heat. When the thermostat calls for heat the valve opens and hot water flows to the radiators.



Type VB20-1 Motorized Butterfly Valve

### Manufacturer's Specifications

**Type VB20-1 Series 20**—Dual control switch can be supplied for controlling auxiliary series 10 or 20 controls.

**\*Valve Sizes:** 1½ in., 2 in., 3 in., 4 in., 5 in., 6 in. screwed types only.

**D Motor Unit:** 110 volts 60 cycles—low voltage control circuit.

Available in other commercial voltages and frequencies at small additional cost.

**Standard Timing:** Full open to full close 30 sec.

**Electric Rating of DS-3 rotary switch:** 10 amps. 110 volts.

**\*The Minneapolis-Honeywell Motor can be used to motorize butterfly valves in sizes above 6-in. produced by standard valve manufacturers.**



## Types V250-1 and V251-1 Motorized Valves

For Steam Flow Control

## Type V250-1



Type V250-1

The application and function of this valve is identical to that of the Type VB20-1, but it is used on steam heating systems. In addition, by changing the valve disc the application of this valve becomes a great deal more diversified as it can be used to control the flow of oil, water, gas or air where operating pressures are not excessive.

**Manufacturer's Specifications—Type V250-1 Series 20**—Dual control switch can be supplied for controlling auxiliary series 10 or 20 controls.

**Valve Sizes:**  $\frac{1}{2}$ ,  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , 2,  $2\frac{1}{2}$  and 3-in., screwed type only.

**Maximum Operating Pressures:**

$\frac{1}{2}$ -in.,  $\frac{3}{4}$ -in.: 100 lbs. per sq. in.

1-in.,  $1\frac{1}{4}$ -in.: 55 lbs. per sq. in.

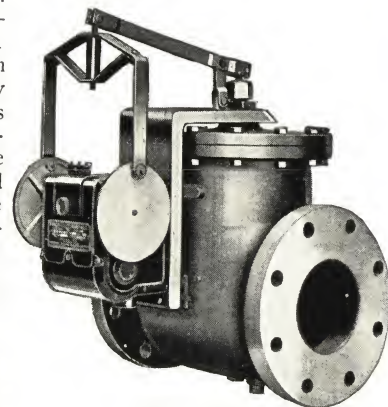
$1\frac{1}{2}$ -in., 2-in.: 25 lbs. per sq. in.

$2\frac{1}{2}$ -in., 3-in.: 10 lbs. per sq. in.

**Standard Timing:** Full open to full close 30 seconds. D Motor unit: 110 volts 60 cycles—low voltage control circuit.

**Electric Rating of DS-3 rotary switch:** 10 amps. 110 volts.

## Type V251-1



Type V251-1

A semi-balanced valve.

This motorized valve design enables the V251-1 to operate dependably on higher pressures. Sturdy construction characterizes this valve with its semi-steel valve body, its bronze valve seats and discs, and its stainless steel valve stem. Ribs running parallel to the valve stem serve as guides to insure positive closure of the beveled valve and valve seat.

**Important Feature—**

The entire assembly (discs and seats) may be removed and replaced without removing the valve body from the line. Thus in case of wear an entire factory ground inside assembly makes quick repair possible.

**Manufacturer's Specifications—Type V251-1 Series 20**—Dual control switch can be supplied for controlling auxiliary series 10 or 20 controls.

**Valve Sizes:**  $3\frac{1}{2}$ , 4, 5 and 6-in., flange type only.

**Maximum Operating Pressures:** 50 lbs. per sq. in., all sizes  $3\frac{1}{2}$  to 6-in. inclusive.

**Standard Timing:** Full open to full close 30 seconds.

## MINNEAPOLIS-HONEYWELL RELAYS

The line of Minneapolis-Honeywell relays incorporates magnetic switches of functions and capacities caring for practically all automatic heating requirements. Starting and stopping motors at the command of sensitive low voltage thermostats and limit controls; interconnecting control units in space heating and

industrial layouts; acting as conventional remote control switches; single phase and polyphase control with overload protection if desired; these and other functions too numerous to mention suggest the range of usages of this equipment.

## MINNEAPOLIS-HONEYWELL THERMOSTATS

## Low Voltage Plain Thermostats

The plain thermostat operates to keep the room in which it is placed at a temperature corresponding to the setting of the thermostat indicator.

These thermostats employ open contacts and are designed only for low voltage operation. They possess the advantage of being calibrated along the entire scale range, permitting their use at any point on the scale without readjustment. Ease of installation features all low voltage thermostats.

**Manufacturer's Specifications:**

**Type 4010 Thermostat (series 10)**—

**Scale Range:** 50° to 90° F. standard. Special scales from 20° to 150° F., with 40° F. range available at small extra cost.

**Operating Differential:** 2° F. May be increased.

**Finish:** Statuary Bronze.

**Overall Dimensions:** Height,  $6\frac{1}{2}$  in.; width  $2\frac{1}{4}$  in.; depth  $1\frac{1}{8}$  in.

**Type 4110 Thermostat (series 10)**—For special industrial purposes.

**Scale Range:** 30° to 60° F. standard. Special scales available at small extra cost.

**Type 40 Thermostat (series 20)**—Identical with 4010 except arranged for Series 20 operation.

**Type 192A Thermostat (series 80)**—2-wire low voltage. Otherwise same as 192.

**Type 192B Thermostat (series 20)**—Otherwise same as 192.

40 and 4010  
Thermostat64G Thermostat  
Height Width Depth  
 $5\frac{1}{4}$  in.  $3\frac{3}{4}$  in.  $2\frac{1}{4}$  in.

## Line Voltage Plain Thermostats

Employ mercury switches. Provide exceptionally close control for this type of instrument.

**Manufacturer's Specifications—Type 192 Thermostat (series 40)**—2 wire line voltage.

**Scale Range:** 55° to 90° F.

**Operating Differential:** 2° F. Adjustable.

**Rating:** Motor loads, 1/20 hp. R.I.

**Resistance Loads:** 2 Amp. at 110 volts; 1 Amp. at 220 volts.

**Finish:** Statuary Bronze.

**Type 135 Thermostat (series 40)**—2 wire line voltage.

**Scale Range:** 55° to 90° F.

**Operating Differential:** 2° F. Fixed.

**Type 137 Thermostat (series 60)**—3 wire line voltage. Identical with Type 135 except arranged for three wire line or low voltage operation.

## High Capacity Room Thermostat

Type 64G incorporates a 10-amp. Con-Tac-Tor Mercury Switch. Can be wired up to a main line circuit direct without a relay up to ratings given below.

**Manufacturer's Specifications—**  
For line voltage circuits.

**Type 64G (2 wire)**—Bronze.

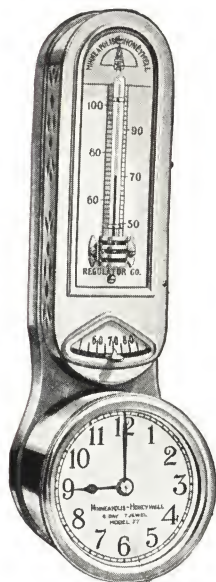
**Resistance Loads:** 10 Amp. 110 Volts; 5 Amp. 220 volts.

**Motor Loads:** 100-250 volts  $\frac{1}{2}$  hp. R.I.,  $\frac{1}{4}$  hp. S.P. or D.C.  
**Adjustable Ranges:** 58° to 82° F.; 38° to 62° F.

192 Thermostat  
Height Width Depth  
 $4\frac{7}{8}$  in.  $2\frac{3}{4}$  in.  $2\frac{1}{2}$  in.



## CLOCK THERMOSTATS



Type 7710

### Electric Clock Thermostat

Utmost convenience is provided by the Electric Clock Thermostat, operated from 60 cycle current through our special transformer. Has self-starting, silent, reliable motor. A perfect timekeeper, combined in a beautiful, compact unit with an accurate thermostat.

Greatest fuel economy, convenience and practicability are provided by Clock thermostats, which automatically, at any predetermined hour at night, move the temperature indicator to a lower setting, and automatically, at any predetermined hour early in the morning, restore the warmer, desired daytime temperature setting.

Week-end and Holiday Shut-off is available, by means of which the fuel-saving "night" temperature is continued throughout the day or days that a building is unoccupied, and the warmer, normal daytime temperature setting is not restored until the morning of the day that the building is again occupied.

Thermostats may also be equipped with automatic Low Limit Cutout feature, which, by cutting the low limit control out of operation whenever the temperature in the section of the building rises slightly above the point at which the thermostat is set (and during the hours in which the section is unoccupied), prevents a low limit control from causing overheating.

Where 60-cycle regulated current is not available, eight-day clock type thermostat, having 7-jewel, accurate, dependable clock made by Minneapolis-Honeywell, should be used.

### Manufacturer's Specifications

**Type T12-1 Electric Clock Thermostat**—To be used with equipment having: Series 10 wiring circuit.

**Self-starting 20-volt Motor:** Operated through transformer from 60-cycle A. C. regulated current.

Thermostat contact mechanism like Type 4010 (see opposite page).

**Overall Dimensions:** Height, 7 $\frac{3}{4}$  in.; width, 2 $\frac{1}{8}$  in.; depth, 2 $\frac{3}{8}$  in.

**Finish:** Silver.

**Type T22-1 Electric Clock Thermostat**—Identical with T12-1, except wired to be used with series 20 equipment.

**Type 7710 Eight-day Clock Thermostat**—To be used with equipment having Series 10 wiring.

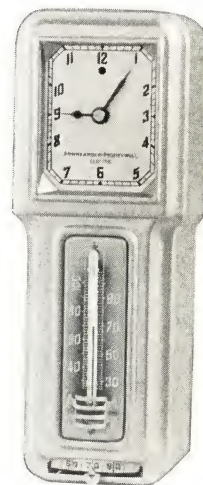
7-jewel temperature compensated clock, providing 16 automatic temperature-setting changes per week without rewinding. Can be arranged to provide 32 temperature changes, 4 instead of 2 per day if desired; but in this event clock must be wound twice a week.

Thermostat portion identical with Type 4010 (see opposite page).

**Overall Dimensions:** Height 9 $\frac{3}{8}$  in.; width, 3 in.; depth 3 in.

**Finish:** Silver.

**Type 77**—Identical with 7710 except wired to operate with Series 20 equipment.



Type T12-1

## UNIFAN CONTROLS

### For Controlling the Fan Motors of Unit Heaters

#### Functions

With Unifan Control the fan motor is permitted to operate only when there is a sufficiently high temperature or pressure in the return line of the heater to insure warm air being circulated. Thus, in case of daytime steam failure or when the steam supply is shut off at night, there is no possibility of cold-air blasts being delivered by the Unit Heater.

There are two types of Unifan Controls. On steam heating systems the Unifan Pressure Control is used. The control of the fan motor in this case is obtained through variations in steam pressure. If it is desired to operate the fan only when there is a sufficient temperature in the coils the Unifan Temperature Control is used. This control is generally used on Vacuum, Vapor and Hot Water Systems.

#### Unifan Pressure Control

The expansion and contraction of a corrugated metal bellows, through pressure changes, within the housing, makes or breaks the circuit to the fan motor. Besides being simple to install, setting of the operating range of the control is easily made. The operating differential of the Pressure Control is about 5% of the maximum scale range. A strain release is provided to absorb all abnormal stresses, and stresses occurring in operation. Both models of the Unifan Pressure Control are Mercury Switch equipped which assures positive switching action at all times.

#### Unifan Temperature Control

This unit is extremely accurate, due to improved scientific construction which insulates the thermostatic element from surrounding temperatures. The Unifan Temperature control can be mounted on either a horizontal or vertical pipe. Temperature changes in the Unit Heater return line are transmitted through the metal cup at the back of the control. Expansion or contraction of the bimetal element housed in this cup result and the circuit to the fan motor is completed or broken. An adjustment lever extends through the bottom of the case for setting the operating range of the control.

Being a surface type control, it is exceptionally easy to install, as it is not necessary to tap or drain the system. Like the Unifan Pressure Control, switching action is provided by a Mercury Switch.

### Manufacturer's Specifications

**Type L16-1 Series 10 Low Voltage Control**—

**Operating Range:**  $\frac{3}{4}$  to 15 lbs. per sq. in.

**Electric Rating:** 3 amps. at 20 volts.

Connection threaded for  $\frac{1}{4}$ -in. pipe (male).

**Over-all Height:** 8-in.

**Type L46-1**—For line voltage control, otherwise identical to Type L16-1.

**Motor Rating:**  $\frac{3}{4}$  hp.,

100-250 volts R.I.  $\frac{1}{2}$  hp. 100-250 volts s-p. or d-c.

**Resistance Rating:** 10 amps. at 110 volts. 5 amps. 220 volts.

**Type L14-1 Series 10 Low Voltage Control**—

**Temperature Range:** 100° to 200° F.

Differential fixed, and dependent upon the rate of temperature change in the pipe on which it is mounted.

**Electric Rating:** 3 amps. at 20 volts.

**Over-all Dimensions:** Height, 5 $\frac{1}{2}$  in.; width, 4 $\frac{3}{8}$  in.; depth, 2 $\frac{1}{2}$  in.

**Type L44-1**—For line voltage control. Same as Type L14-1 except for electric rating.

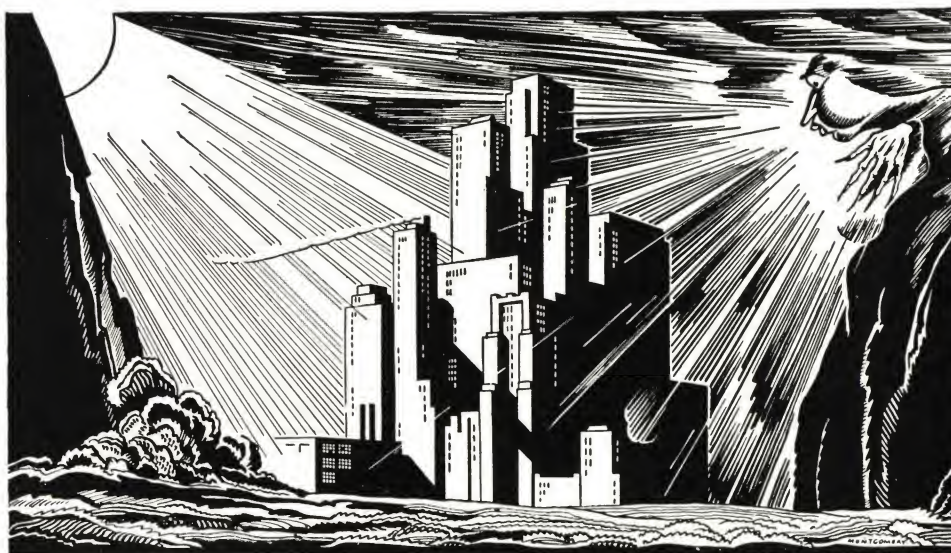
**Motor Rating:**  $\frac{3}{4}$  hp. 100-250 volts. R.I.  $\frac{1}{2}$  hp. 100-250 volts s-p. or d-c.

**Resistance Rating:** 10 amps. at 110 volts; 5 amps. at 220 volts.





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